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Patent
Atty. Docket: N-16,199B

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Pharenthyna Miranda
August 26, 2005

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Applicant	:	C. SERBUTOVIEZ et al.
Application No.	:	09/877,312
Filing Date	:	June 8, 2001
For	:	PDLC CELL
Examiner	:	Sow Fun Hon
Art Unit	:	1772

Board of Patent Appeals and Interferences
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, Virginia 22313-1450

REPLY BRIEF ON APPEAL (37 C.F.R. 41.41)

Sir:

This brief is in reply to the Examiner's Answer dated June 27, 2005.

Grounds of Rejection:

On page 3, claims 5 and 7-9 are rejected as being obvious from Japanese Patent JP 05019240 to Masayuki.

The Office first states:

> Masayuki teaches that the advantage of the mixture of acrylates , one readily miscible (of good compatibility) and one poorly miscible (weak interaction) with the liquid crystal is that it allows for control of phase separation structure of the polymer dispersed liquid crystal (PDLC) (section [0013]).

The undersigned has reviewed section 0013, and is unable to find this teaching. Section 0013 only states:

> As a monomer ingredient, the monofunctional acrylate monomer expressed especially with the general formula 1 from the interaction in an interface being weak and low-battery-ization being achieved is desirable after that compatibility with the liquid crystal before hardening is good, and hardening. Moreover, only by the monofunctional acrylate monomer, since hardenability is bad and control of phase separation structure is difficult, PDLC suitable for a display device is formed by using together acrylic ester oligomer with sufficient compatibility with liquid crystal.

Thus, the monofunctional acryalte monomer expressed by formula 1, which is Nonyl-phenol EO denaturation acrylate, has a weak interaction with the interface (ie: it is poorly miscible with the interface). As best as the undersigned can understand, JP '240 teaches that compatibility with the liquid crystal before hardening is good. Since hardenability is bad and control of phase separation structure is difficult, a PDLC suitable for a display device is formed by using acrylic ester oligomer with good compatibility with the liquid crystal. Thus, JP '240 emphasizes that the good compatibility of the acrylic ester oligomer makes the PDLC suitable for a display device. JP '240 does not state that phase separation is accomplished, or that an advantage of combining one readily miscible acrylate with one poorly miscible acrylate allows for good control of phase separation. Phase separation is only mentioned as difficult.

The Office states:

Therefore a mixture of an ethoxylated acrylate monomer, which is instead readily miscible with the liquid crystal, coupled with acrylate monomer, which is instead poorly miscible with the liquid crystal is the result of routine experimentation by one of ordinary skill in the art at the time the invention was made, within the realm of the invention of Masayuki, because it follows the same principle of a miscible/immiscible acrylate mixture which results in good control of the phase separation structure of the polymer dispersed liquid crystal.

Thus, to summarize, the Office's rejection is based on the principle that there is good control of phase separation when one acrylate is miscible with the liquid crystal and one acrylate is poorly miscible (or immiscible) with the liquid crystal. However, applicants are not simply claiming one acrylate that is miscible and one acrylate that is poorly miscible with a liquid crystal. Applicants recite in claim 5, "the first type of monomer being an ethoxylated acrylate and readily miscible with a liquid crystalline material." Applicants recite in claim 6 that "the first type of monomer [of claim 5] is an ethoxylated alkyl-phenolacrylate whose alkyl group comprises at least five C-atoms." As the Office is no doubt aware, all limitations of a claim must be considered meaningful, and, "the PTO must consider all claim limitations when determining patentability of an invention over the prior art." *In Re Lowry*, 32 USPQ2d 1031, 1034 (Fed Cir. 1994). As will be explained in more detail below, the Office has not considered these limitations. Instead, the Office has reduced these limitations to simply "acrylates" to attempt to fit the limitations within the scope of its argument.

The determination of which acrylates are poorly miscible and which acrylates are readily miscible with a liquid crystal is a task that is completely independent of the principle of good control of phase separation. The degree of compatibility of various acrylates with a liquid crystal is not related to the principle of good control of phase separation. Instead, the compatibilities of various acrylates are based on their own inherent nature or structure. The Office has not addressed why it would be obvious that the claimed ethoxylated acrylate has good miscibility with the liquid crystalline material as claimed in claim 5. The Office has

not addressed why it would be obvious that the claimed ethoxylated alkyl-phenolacrylate whose alkyl group comprises at least five C-atoms has good miscibility with the liquid crystalline material as claimed in claim 6. The Office has only explained that it is obvious to use one acrylate monomer of poor miscibility with the liquid crystal material and one acrylate monomer of good miscibility with the liquid crystal material based on the principle of good control of phase separation, completely ignoring whether it was known or suggested to use ethoxylated acrylate or ethoxylated alkyl-phenolacrylate (whose alkyl group comprises at least five C-atoms) at the time of the invention for good miscibility with a liquid crystalline material. In fact, the Office has not shown a single reference that shows that ethoxylated acrylate or ethoxylated alkyl-phenolacrylate (whose alkyl group comprises at least five C-atoms) were known to be miscible with the liquid crystalline material. By stark contrast, the only reference cited by the Office, JP '240 to Masayuki, teaches that an ethoxylated acrylate or ethoxylated alkyl-phenolacrylate whose alkyl group comprises at least five C-atoms are poorly miscible with a liquid crystalline material.

When one skilled in the art seeks out to find a monomer of good miscibility and a monomer of poor miscibility with the liquid crystalline material, he can look to what is already known in the art. In other words, he can look to what monomers have already been determined to be poorly miscible with the liquid crystalline material and what monomers have already been determined to be readily miscible with the liquid crystalline material. Thus, only routine experimentation is needed to practice what is known in the art.

Additionally, one skilled in the art can mix various monomers with liquid crystal in a laboratory as a trial and error method for determining which monomers are poorly miscible with the liquid crystalline material and which acrylates are readily miscible with the liquid crystalline material. This trial and error method is undue experimentation unless there is information known in the art which suggests that a certain experiment may prove successful. It is akin to "searching for a needle in a haystack" unless there is something

to reasonably suggest that the experiment will be successful. Similarity in structure is sometimes useful for suggesting that a certain experiment may be successful. Again, one must rely on what it is already known in the art about the structures.

Turning to the instant case, one skilled in the art at the time of the invention looking at JP '240 to Masayuki would understand that the inherent structure of an ethoxylated acrylate or an ethoxylated alkyl-phenolacrylate (whose alkyl group comprises at least five C-atoms) makes it incompatible or poorly miscible with the liquid crystalline material. Thus, one skilled in the art would simply not attempt to use either as a monomer that is readily miscible with the liquid crystal. The principle of good control of phase separation does not change the undesirability for using specifically these claimed monomers as a monomer that is readily miscible with the liquid crystalline material.

The Office has not provided any reference that suggests that trial and error work in making an ethoxylated acrylate or an ethoxylated alkyl-phenolacrylate (whose alkyl group comprises at least five C-atoms) readily miscible with the liquid crystalline material would be successful and therefore routine experimentation. Rather, the Office has only provided a single reference that teaches that ethoxylated acrylate or an ethoxylated alkyl-phenolacrylate (whose alkyl group comprises at least five C-atoms) would be poorly miscible in the liquid crystalline material. The principle of good control of phase separation does not provide any reasonable expectation that such trial and error work would be successful, because it does not influence the degree of compatibility of individual monomers in a liquid crystalline material. Only the structure and nature of the monomer structure bears any influence on the likelihood that it will either be miscible or immiscible with the liquid crystalline material.

Since the Office has not provided any suggestion that one skilled in the art conducting trial and error work would have a reasonable expectation of success in making an ethoxylated acrylate or an ethoxylated alkyl-phenolacrylate (whose alkyl group

comprises at least five C-atoms) readily miscible with the liquid crystalline material, the Office's position is that the present invention is obvious because it would be **obvious to try** ethoxylated acrylate or an ethoxylated alkyl-phenolacrylate (whose alkyl group comprises at least five C-atoms) as monomers that are readily miscible in the liquid crystalline material in a trial and error experiment akin to searching for a needle in a haystack. Whether it is **obvious to try** an ethoxylated acrylate monomer as readily miscible with a liquid crystalline material as a part of trial and error experiment, with not even a single suggestion supporting a reasonable expectation of success, is not the standard for determining obviousness. *In re Geiger*, 815 F.2d at 688, 2 U.S.P.Q. 2d at 1278 (Fed. Cir. 1987).

Response to Argument:

(ii) The Office further states that:

> changing the liquid crystal in order to obtain an improvement in other optical properties, is within the scope of routine experimentation. The liquid crystal may not have the same miscibility properties as the liquid crystal in the examples of Masayuki (MJ90657 by Merck), but can be made to have the same miscibility properties of the ethoxylated acrylate of Masayuki, in order to take advantage of the principle of using a miscible monomer/immisicible monomer mixture

Changing of the liquid crystal is not suggested in any reference that the Office has cited. If it is so obvious to change the liquid crystal, then the Office has not explained why JP '240 to Masayuki does not teach or suggest changing the liquid crystal to improve the miscibility of the nonyl-phenol acrylate which is taught to be poorly miscible and therefore problematic. Since JP '240 does not teach or suggest changing the liquid crystal, and the Office has not provided any other references showing that one skilled in the art the time of the invention knew of changing the liquid crystal, applicants respectfully submit that the Office is using impermissible hindsight by reverse engineering the present invention based on what the Office has learned from applicants disclosure. In other words, since the Office now aware of an ethoxylated acrylate that is miscible in liquid crystal, the Office submits that it would

be obvious to change the liquid crystal. At the time of the invention however, one skilled in the art, only being aware of JP '240, would not have any motivation to change the liquid crystal since it was not taught or suggested anywhere.

Also, trial and error experimentation without any teaching or guidance of how to change liquid crystal to affect the miscibility of a monomer is not routine experimentation. Because the Office does not cite to any reference for teaching or suggesting changing the liquid crystal, it not clear how which liquid crystal should be used. Searching for the right liquid crystal to change the miscibility of a monomer requires knowledge beyond the scope of what is taught by JP '240. Without this knowledge, such a search constitutes undue experimentation. Furthermore, such a change adds an additional factor to consider in trial and error experimentation, resulting in undue experimentation.

The Office further assumes that the liquid crystal of JP '240 is different from the liquid crystal of applicants invention. However, JP '240 does not teach the nature of the liquid crystal. Thus, one skilled in the art at the time of the invention, having knowledge of JP '240, would not have any starting point for determining which liquid crystal could be used to change the miscibility of the ethoxylated acrylate, or if changing the liquid crystal would even be helpful. One skilled in the art at the time the invention was made, would only be drawn away from using ethoxylated acrylate or ethoxylated phenol-acrylate (whose alkyl group comprises at least 5 C atoms) with a liquid crystalline material.

Applicants further submits that the Office's argument is based on personal knowledge since no reference is cited. Since this is a new point, applicants have not been given an opportunity to request an affidavit pursuant to 37 C.F.R. §1.104(d)(2). However, the Office's arguments are conclusory. At this stage, such conclusory statements are meritless without specific data being available for contradiction.

(iii) The Office states:

> Appellant states that the same ethoxylated acrylate used by Masayuki, is used by Appellant (Appeal Brief dated April 4, 2005, page 5). With the same ethoxylated acrylate of Masayuki, there is no experimentation involved in the selection of the ethoxylated acrylate.

Applicants do not only recite a selection of an ethoxylated acrylate. Applicants recite an ethoxylated acrylate being readily miscible with the liquid crystalline material. Applicants reiterate that Masayuki teaches the ethoyxlated acrylate as being poorly miscible with the liquid crystal while applicants claim recites the ethoxylated acrylate being readily miscible with the liquid crystalline material. Thus, there would be no desire, motivation, or incentive based on JP '240 to use the ethoxylated acrylate for being readily miscible with the liquid crystalline material. Furthermore, one skilled in the art would find undue experimentation since JP '240 expressly shows that ethoxylated acrylate in the conditions described in that patent, is poorly miscible with the liquid crystalline material. Miscibility may be depend on various factors such as the degree of ethoxylation of the acrylate and the structure of the acrylate. The fact that JP '240 and the present invention have such a difference is by itself an indication that the one skilled in the art at the time the invention was made, would only find undue experimentation in seeking an ethoxylated acrylate that is readily miscible with the liquid crystalline material. Experimentation is involved in selecting an ethoxylated acrylate that is readily miscible with the liquid crystalline material because one skilled in the art at the time the invention was made, could end up with the results of JP '240, an ethoxylated acrylate that is poorly miscible with the liquid crystalline material.

(v) The Office states:

> Miscibility is known to occur when materials with the same functional groups are mixed together. Therefore, one of ordinary skill in the art would have had a reasonable expectation of success in finding an ethoxylated acrylate liquid crystalline material to be miscible with the ethoxylated acrylate of Masayuki, and correspondingly immiscible with the monomer with which the ethoxylated acrylate of Masayuki is immiscible.

However, one skilled in the art at the time the invention was made would have to have some knowledge that a liquid crystal containing ethoxylated acrylate exists. There is no evidence that one skilled in the art at the time the invention was made was actually aware that such a liquid crystal exists, or could be made. Since JP '240 does not describe the nature of the liquid crystal, it is not clear why the ethoxylated is taught to be poorly miscible with the liquid crystal. One skilled in the art at the time the invention was made, only being knowledgeable of JP '240, would not have any desire, motivation, or incentive to use the same monomer as being readily miscible with the liquid crystalline material.

Furthermore, the Office states that an "ethoxylated acrylate liquid crystalline material" can be used. However, this is based on personal knowledge. No reference shows that such a liquid crystal material exists. Therefore, since the Office's example of an "ethoxylated acrylate liquid crystalline material" is not cited in any reference, it is conclusory and without merit, since no specific data is provided.

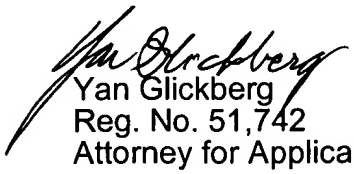
Finally, applicants respectfully submit that the miscibility of a polymer with a liquid crystal is dependent on the degree of orientational order of the liquid crystal molecules. Thus, a broad spectrum of polymers may be suitable as readily miscible with the liquid crystalline material, requiring undue experimentation. Thus, applicants disagree that an ethoxylated acrylate liquid crystalline material can simply be used to improve the miscibility of the claimed ethoxylated acrylate, since orientational order of the liquid crystal molecules is one of many other factors that would have to be considered as well, contributing to the complexity of experimentation.

Applicants have only replied to the arguments in the Examiner's Answer. No new issues have been raised.

Based on the arguments above, the claims on appeal are believed to be patentable over the prior art, and the application and claims are believed to be in condition for allowance.

The Board is, therefore, respectfully requested to reverse the Examiner's final rejection.

Respectfully submitted,



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